

### Claims

What is claimed is:

1.       A system for regulating nitrided gate oxide layer formation in  
 5 semiconductor devices, comprising:  
       at least one nitrided gate oxide former operative to form one or more nitrided gate  
 oxide layers on a portion of a wafer;  
       a nitrided gate oxide former driving system for driving the at least one nitrided  
 gate oxide former;  
 10       a system for directing light to the portion of the wafer;  
       a system for collecting light reflected from the portion of the wafer;  
       a measuring system for measuring parameters of nitrided gate oxide formation  
 nitrogen concentration based on collected light reflected from one or more nitrided gate  
 oxide formations; and  
 15       a processor operatively coupled to the measuring system and the nitrided gate  
 oxide former driving system, the processor receiving nitrided gate oxide formation  
nitrogen concentration data from the measuring system and the processor using the data  
 to at least partially base control of the at least one nitrided gate oxide former so as to  
 regulate nitrided gate oxide nitrogen concentration in the portion of the wafer.  
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2.       The system of claim 1, wherein the thickness of the nitrided gate oxide  
 layer is less than ten nanometers.
3.       The system of claim 1, the measuring system further including a  
 25 scatterometry system for processing the light reflected from the one or more nitrided gate  
 oxide layer formations, the processor being operatively coupled to the scatterometry  
 system, the processor analyzing data relating to nitrogen concentration received from the  
scatterometry system, and the processor basing control of the at least one nitrided gate  
 oxide former at least partially on the analyzed data.

4. The system of claim 1, wherein the semiconductor device is at least one of a volatile memory, a non-volatile memory, a MOSFET, a microprocessor, a flash memory, an SRAM and a DRAM.

5. The system of claim 1, the processor mapping the wafer into a plurality of grid blocks, and making a determination of nitrided gate oxide layer formation nitrogen concentration at a grid block.

6. The system of claim 1, wherein the processor determines the existence of an unacceptable nitrided gate oxide nitrogen concentration for at least a portion of the wafer based upon the determined concentration differing from an acceptable value.

7. The system of claim 6, wherein the processor controls the at least one nitrided gate oxide former to regulate nitrided gate oxide layer formation on the at least one portion to an acceptable value.

8. A method for regulating nitrided gate oxide layer formation, comprising:  
defining a wafer as a plurality of portions;  
establishing one or more nitrided gate oxide layer formations to be formed;  
directing light onto at least one of the nitrided gate oxide layer formations;  
collecting light reflected from at least one nitrided gate oxide layer formation;  
analyzing the reflected light to determine nitrogen concentration of the at least one nitrided gate oxide layer formation; and  
controlling one or more nitrided gate oxide layer formers to regulate gate oxide formation of the at least one nitrided gate oxide layer formation.

9. The method of claim 8, wherein analyzing the reflected light further comprises:  
employing a scatterometry system to process the reflected light.

10. The method of claim 8, further comprising:  
collecting light passing through the at least one nitrided gate oxide layer  
formation; and  
analyzing the passed through light to determine the nitrogen concentration of the  
5 at least one nitrided gate oxide layer formation.

11. The method of claim 8, wherein analyzing the passed through light  
further comprises:  
using a scatterometry system to process the passed through light.

12. The method of claim 8, further comprising:  
using a processor to control the at least one nitrided gate oxide former based at  
least partially on data received from the scatterometry system.

13. The method of claim 11, further comprising:  
using a processor to control the at least one nitrided gate oxide former based at  
least partially on data received from the scatterometry system.

14. A method for regulating nitrided gate oxide layer formation, comprising:  
partitioning a wafer into a plurality of grid blocks;  
using one or more nitrided gate oxide layer formers to form one or more nitrided  
gate oxide layers on the wafer, each nitrided gate oxide former functionally  
corresponding to a respective grid block;  
determining nitrogen concentration of the one or more nitrided gate oxide layer  
25 formations on one or more portions of the wafer, each portion corresponding to a  
respective grid block; and  
using a processor to coordinate control of the nitrided gate oxide layer formers,  
respectively, in accordance with determined nitrided gate oxide nitrogen concentration of  
the respective portions of the wafer.

15. A system for regulating nitrided gate oxide layer formation, comprising:  
first sensing means for sensing nitrided gate oxide layer formation nitrogen  
concentration of one or more of nitrided gate oxide layers;

5 second sensing means for sensing thickness of one or more of nitrided gate oxide  
layer formations;

third sensing means for sensing uniformity of one or more of nitrided gate oxide  
layer formations;

forming means for forming one or more nitrided gate oxide layers; and

10 controlling means for selectively controlling the forming means so as to regulate  
nitrided gate oxide formation.